Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Journal of the Society of Arts.

FRIDAY, JANUARY 26, 1855.

◆

MEETING OF COUNCIL.

January 24, 1855.

At the meeting of Council held this day the following resolutions were passed:—

1. The Council desires to express the best thanks of the Society to Her Majesty's Government and to the Government of the Emperor of the French, for causing the postage between the two countries to be reduced to four pence for a single letter; a reasonable sum, which in its component parts of 2d. for the usual French inland rate, 1d. for the sea transit, and 1d. the usual British rate, gives effect to a principle which the Postage Association, the petitions of most numerous places and associations in the United Kingdom, and Mr. Elihu Burritt, have for a long time advocated.

2. The Council considers this reduction especially well-timed, and has confidence that it will be the means of increasing the friendly alliance between France and the United Kingdom, and advancing the Arts, Manufactures, and Commerce of the two nations.

3. The Council trusts that the initiative taken by France and the United Kingdom, may suggest to the United States the policy of applying the principle of an ocean postage to the inland rate of the two countries.

Ordered—That the Secretary transmit a copy of these resolutions to the Postmaster General, and thank him, in the name of the Society, for his own personal labours.

Also—That the Secretary transmit copies to the French ambassador, with a request that he will communicate the same to the Imperial Government of the Emperor, also to the ministers of the United States, and also to Mr. Elihu Burritt.

EIGHTH ORDINARY MEETING.

Wednesday, January 24, 1855.

The Eighth Ordinary Meeting of the One Hundred and First Session, was held on Wednesday evening, the 24th instant, John Brady, Esq., M.P., in the chair.

The following Candidates were balloted for, and duly elected ordinary members:—

Chaplin, Frederick William.
Chapman, Thomas, F.R.S., F.S.A.
Emmens, William.
Maxtone, James.
Redpath, Leopold.
Streatfield, J. Fremlyn.

The following Institution has been taken into Union since the last announcement:—

384. Bristol, City Lectures Literary Association.

The paper read was

ON PEAT AND OTHER VEGETABLE CHARCOAL AND SOME OF ITS USES.

By William Longmaid.

The subject to which I propose to direct your attention this evening is Charcoal, and some of its uses. The materials forming the earth's surface have been described by geologists and chemists, as consisting of comparatively a few simple substances; and their distribution and uses instructively and beautifully illustrate the power, the wisdom, and the goodness of the Almighty Creator, and furnish unlimited evidence of design.

Of undecomposed substances, probably there is no one that plays more important and varied parts than carbon; if we contemplate the diamond, that beautifies the diadem of royalty, the still more beautiful electric light, or the vast deposits of coal, so extensively distributed in this favoured island, carbon must be regarded as an agent of primary importance.

If we extend our researches to organic beings, we find that with the exception of the framework of animals and the shells of crustacea, carbon forms a moiety of the solid materials of all organic beings, whether animal or vegetable; the beautiful flowers and foliage that adorn the earth, the colours that deck the plumage of the feathered tribes, no less than the tints that clothe the inhabitants of the teeming oceans and rivers, the fragrant perfume wafted on the gentle breeze, all owe their existence in part to carbon; nay, even some of the solid rocks that form the framework of the great globe itself, are compounded in part of this substance.

However varied in form, and widely-diffused carbon may be in nature, in its countless combinations it is no less useful, in the arts, sciences, and manufactures; indeed, we trace its effects everywhere, in fact, if carbon were to be withdrawn from the earth, organic existence would cease, and the physical condition of the earth itself would be changed.

It may not be amiss, then, to devote a few minutes this evening to the consideration of carbon, in some of its forms and uses, as it is found in the arts and manufactures, particularly under the term vegetable charcoal, the produce of wood and peat.

Charcoal produced from vegetable matter is carbon isolated from the constituents of water, with which it is always combined in organic substances; there are several methods ordinarily employed for this purpose; one in considerable use is most rude, and no doubt of great antiquity; it consists in digging a pit in the earth, and piling up pieces of wood or peat in large heaps, which are covered with clods of earth in such a manner that the pile may be ignited at the base; when the fire is well kindled, more clods are placed over the pile, in order to prevent the too free access of atmospheric air, and which is eventually excluded; the heap is allowed to stand from one to five or six weeks, the length of time depending on the size of the operation. Another method is much practised in some parts of the Continent, and consists of a furnace somewhat in the form of a kiln, with apparatus to exclude the air; it is filled with the material ignited at the base, and the operation proceeds much in the same manner as before described. Modern science has provided a more perfect operation in destructive distillation in retorts, whereby the volatile products are condensed and are of great practical utility.

In the first method I have described, about 18lbs. of charcoal are obtained from every 100lbs. of dry wood; this is considered a fair yield; the other products are mostly lost. In the second method more tar and pitch are obtained with the same quantity of charcoal. But by the more elaborate process of distillation, naptha, acetic acid, ammonia, and other matters, are obtained, together with about 20 to 25 lbs. of charcoal for every hundred pounds of wood.

There is yet a more recent process for the manufacture of vegetable charcoal, for which, jointly with my son, I have obtained letters patent; this process consists in steeping vegetable matter in dilute sulphuric acid, and drying it at a low temperature, whereby we obtain from 40lbs. to 65lbs. of charcoal for every 100lbs. of dry material submitted to the operation.

I presume the experiment I am about to make with sulphuric acid and sugar, has been exhibited in every lecture room in the United Kingdom; this demonstrates the principle of the new mode of manufacturing charcoal, the sulphuric acid has a greater affinity for the elements of water than carbon, and the latter is isolated. We have found that every description of vegetable matter to which we have applied this mode of treatment, has exhibited the same phenomena.

The chemical action that takes place is well understood, and presents no novelty; but the application of this principle to useful purposes, on a large scale, I believe has not before been accomplished; this experiment will demonstrate the nature of the process; this is sawdust of pine timber, and has been steeped in sulphuric acid of the strength of 3 degrees of Twaddle's hydrometer. I will now place it on this plate, and apply a lamp underneath—we shall soon see the result.

Perhaps it is impossible to over-estimate the importance of charcoal. England is possessed of vast deposits of mineral coal, which enables our manufacturers to produce iron at a cost that bids defiance to all competition. The deposits of coal and iron-stone may be regarded as the foundation of all our greatness as a nation, but whilst the iron is produced in quantities of which the mind can scarcely conceive an adequate idea, and whilst it is of a quality fitted for an endless variety of purposes, for which strength and cheapness are the prime qualifications, it is totally unfit for the manufacture of steel. This circumstance renders this country dependent on foreign countries, chiefly Russia and Sweden, for iron of superior quality. The sole cause of the superiority of foreign iron, is the fact that charcoal is the fuel employed for smelting the ore.

The coke used by the British smelter contains a sensible amount of sulphur, chiefly in combination with iron, and exists in the coal in the form of iron pyrites; it is found practically impossible, in the great operations of iron smelting, to separate it at a cost that would render it practicable.

On the other hand, charcoal is all but absolutely free from sulphur, and it exists in vegetable matter in the condition of sulphuric acid, and combined with alkali, thus forming a neutral salt, which combines with the earthy matters of the ore, and thus forms an ingredient of the slag. If from any unforeseen circumstances our supplies of foreign iron should cease, our steel and cutlery manufacturers would be driven to great extremity, and this branch of British industry, of world-wide reputation, would be in danger of considerable derangement.

There are other branches of manufacture dependent on charcoal for their success;—gunpowder and tin-plates; it isalso largely used by founders and engineers, and more recently it has been used as a deodoriser, disinfecter, and decoloriser, and also as a manure.

A cursory glance at the position and limited surface of England, with its dense and increasing population, will be sufficient to convince us that space cannot be spared for the growth of timber for fuel; this will be still more evident, if we consider for a moment the consumption of coals in the metropolitan district for the year 1854, which amounted to 3,400,000 tons. The quantity of wood necessary to produce charcoal of equal heating power, would exceed 400,000,000 cubic feet. If we add to the quantity required for London, the quantity required for the consumption of the country and for exportation, we shall find that the entire surface of Great Britain would be inadequate to grow timber sufficient to manufacture charcoal of equal heating power. Whilst this is undoubtedly the case, and with an ever-increasing demand for fuel, attention has been directed to the *bogs* of the United Kingdom, as offering an exhaustless mass of organic matter, ready to be converted by the hand of science into fuel of first-rate quality, eminently suited for most of our manufacturing and domestic purposes.

The extent of bog land in Ireland alone exceeds 3,000,000 acres in surface, in many localities ascertained to be of a depth of 30 feet and upwards.

It is well known that peat charcoal, when employed as fuel for smelting iron, and tempering edge tools, &c., has produced articles of surpassing excellence; it is largely used on the Continent in smelting works, and for domestic purposes.

Peat is vegetable matter undergoing partial decomposition, and probably its formation commenced at a very remote period of the world's history. It is found in natural basins, formed by the inequalities of the earth's surface, wherein the water is dammed up and prevented from flowing into adjacent streams and rivers. In these lakes vegetable matter has accumulated and is undergoing various changes, and final decomposition. In the earlier deposits it is characterised by a nearly homogeneous structure; but the later and more superficial deposits present a less decomposed and compacted character, and has the general appearance of an entangled or felted structure, composed of partially decomposed moss and grass, and not unfrequently shrubs and trees; the moss and grass have the appearance of gradual and successive decomposition at the roots, whilst they continue a vigorous vegetation at the surface.

The entire mass, both of the more compact and the less solid peat, is composed chiefly of ligneous matter, and may be considered as analagous to woody fibre; its quality, however, is frequently affected by the special circumstances of locality. The best samples we have met with have contained, when dried, about 70 to 75 per cent. of carbon, but other samples were contaminated with earthy matters to the extent of 5 to 10 per cent. The average impurities may be taken at 4 to 5 per cent., and we have found some samples of peat charcoal yielding 94 per cent. of fuel.

The attention of the scientific world is now fully awakened to the importance of rendering this vast source of wealth available; not that the coal fields of Great Britain are likely soon to be exhausted, notwithstanding the millions upon millions of tons raised annually, but as a matter of economy in the race of the arts, manufactures, and civilisation, it is of first importance to get the greatest possible amount of good at the lowest possible cost. What, then, is the present state of the fuel market? The demand for coke and coals for locomotives, for marine engines, for exportation and other purposes is so enormous, that the price has been raised to such an extent as to threaten the destruction of extensive industrial operations carried on on the Tyne and in other coal districts. Immense quantities of coke are being sent to the extremities of Great Britain and Ireland for working the locomotives of the railways, whilst many of the lines traverse vast tracts of bog capable of being made into fuel, equal in value to coke, and, in such localities, at a third of its cost.

There is another remarkable feature which may be noticed. Ironstone is at this moment being raised in the immediate vicinity of deposits of peat, but in the absence of any economical carbonising process, to render it fit for smelting iron, the ore has to be sent to smelting works, at a considerable charge for carriage. It is a remarkable fact that iron-stone is found constantly occuringin the vicinity of deposits of peat, and when once this treasureis brought fairly to bear, we may anticipate the production of iron of the finest quality.

It may be truly affirmed of Ireland that she contains within her borders all the raw material, except cheap fuel, to make her a worthy competitor of Great Britain as a manufacturing country; and if once a cheap and practical method be devised of rendering the peat into good charcoal, I can see no end to the prosperity of that country,—abounding, as it does, in rich deposits of iron, copper, lead and sulphur ores in unlimited quantities, together with rock-salt, clay, limestone, slates, and granite, having also fine lakes and rivers, the rude materials that form the foundation of a nation's greatness as a manufacturing people. In addition to the mineral deposits, Ireland possesses in her hardy sons the bone and muscle and the energy necessary to raise her to the first rank as a manufacturing nation; and I do not despair of seeing the peat-bog in course of transformation into charcoal, and her idle population become industrious and prosperous manufacturers. I venture to predict, that when the manufacturing capabilities of that country, so rich in native, and at present unappreciated materials, become fully known, capital will flow readily to her aid. But as long as Irish manufacturers have to draw their chief supplies of coal and coke from England and Scotland, her manufactures must languish, and so long will her vast mineral treasures remain undeveloped, and her population be without profitable employment.

The question may arise,—Why is the iron produced by vegetable charcoal of better quality than that by mineral coke? The answer is obvious; iron has an intense affinity for sulphur, and mineral coal contains iron pyrites, a portion of the sulphur of which remains with, and injures the texture of the metal smelted by its agency, and renders it unfit for the manufacture of steel, as it is impossible, except at an enormous cost, when once the sulphur has combined with the iron, to make a perfect separation.

Vegetable charcoal also contains some sulphur, but in all cases in a neutral form, combined with potash, soda, or other alkaline re-agents; in this condition it readily combines with the earthy matters of the ore, and forms an ingredient of the slag. The peat charcoal we propose to manufacture also contains sulphur, chiefly in the neutral state, as alkaline salts, but a small portion also remains as free acid. In smelting operations the alkaline sulphates combine with the earthy matters of the ore, forming slag, and the free sulphuric acid is decomposed. One atom of the oxygen of the acid combines with an atom of carbon, forming carbonic oxide, and liberating the remaining oxygen and the sulphur as sulphurous acid; thus all the sulphur of the free sulphuric acid is evolved into the atmosphere.

In pit coal the sulphur exists in varying quantities from one to fifteen per cent. When it exists in larger quantity than two to three per cent. it renders the coal unfit for many manufacturing purposes.

There is another quality of fuel of great importance, its heating power. The following table is an extract from Dr. Ure's work, and may be regarded as the mean results of numerous experiments made by that gentleman. It gives the quantity of water raised from the freezing to the boiling point, and the quantity of water of the temperature of 212°, evaporated by the combustion of one pound of fuel in each case:—

	Pounds of water raised from 32 to 212 degrees. lbs.		Water at 212° evaporated.
Perfectly dry wood . . .	35	...	6·36
Wood in its ordinary state	26	...	4·72
Do. charcoal	73	...	13·27
Pit-coal	60	...	10·90
Coke	65	...	11·81
Peat	30	...	5·45
Peat charcoal	64	...	11·63

It will be seen from the above table that wood charcoal stands first in heating power, coke second, and peat charcoal within 1·3 per cent. equal to coke.

Charcoal has also the peculiar faculty of absorbing watery vapour and gases to an extraordinary extent. Professor Liebig states the result of experiments conducted by Saussure, that one volume of charcoal in 24 to 36 hours absorbed 90 volumes of ammoniacal gas, 65 sulphurous acid, and 55 of sulphuretted hydrogen. It also absorbs nitrogen and many other gases. This property of charcoal has of late been turned to practical account, as it has been used as a disinfector and deodoriser, some interesting particulars of which will be found in a paper read to this Society by Dr. Stenhouse, in the early part of last year.* Since that period experiments have been made by Mr. Barford, at Bartholomew's Hospital. The particulars were published in the *Lancet* a few weeks since. The writer, after describing the substances possessing the property of deodorising and disinfecting, and the chemical action on which they respectively depend, and also pointing out their several defects, adds, that they are all open to serious objections; but the one which practically will be found the most effectual, I believe, has received the least patronage. This is charcoal, a body whose disinfecting powers have long been known, but its mode of application has been quite neglected.

A most perfect trial has been made in the dissecting rooms of St. Bartholomew's Hospital, which must abound in noxious gases and putrescent odours. On thoroughly heating the charcoal and placing it in shallow vessels about the rooms, it acted so promptly, that in ten minutes not the least diffused smell could be detected. So quick and effectual was its action, that arrangements have been made for its constant use. As a purifier of hospital wards, both civil and military, it might be applied with great advantage, saving patients from the unpleasant smells and effluvia from gangrenous wounds; thus the patient himself and those in adjacent beds, would not be subjected to the influence of putrescent odours. All these the charcoal would effectually absorb. Charcoal is more efficacious than any other disinfectant when applied in the manner described, absorbing gases of every kind. It does not require the presence of any other substance to assist its action, but without stint or scruple collects noxious vapours from every source, not disguising, but condensing and oxydising the most offensive gases and poisonous effluvia, converting them into simple, inert, stable compounds. It is easy of application, and is economical, comes within the reach of the poorest, and can be safely placed in the hands of the most ignorant, thus combining advantages not possessed by any other disinfectant.

Mr. Barford also described a process for purifying the charcoal, so as to renew its powers, but this need not be practised, for the charcoal, after being used in the hospitals, is more valuable as a manure, by reason of the gases it has absorbed; thus its use need not entail any expense on such establishments. This brings us to the consideration of charcoal as a manure, for which purpose it is likely to become an important agent, especially from the circumstance of its possessing such intense affinity for nitrogenous gases and aqueous vapour.

Professor Liebig states that peat and spent bark are most difficult forms of organic matter to deal with as manure; that peaty matter remains for years exposed to the influence of air and water without undergoing change, and in this state yields little or no nutriment to plants. Recent experience has, however, shown that when organic matters, such as peat and spent tan, are converted into charcoal, they become exceedingly valuable as vehicles for the transmission of water, nitrogenous compounds, carbonic acid, &c., to the plants, first separating these matters from the atmosphere, and again yielding them up when required.

The mode of applying charcoal as manure is simple; it should be ground to a coarse powder, and then strewn over farm yards, manure heaps, stables, cow-houses, pigstyes, cess-pools, or placed in manure-tanks, urinals, &c.

It is suitable for being applied, also, without mixture by the drill or broad cast, in the proportion of 4 to 7 cwt. per acre, to all green and corn crops, and will be found a valuable addition to most soils, especially those which are composed of clay.

---

* *Vide* "Journal of the Society of Arts," Vol. ii., p. 245.

Perhaps I may be permitted to make a short digression, for the purpose of introducing to your notice another preparation of peat; this is peat manure produced by steeping the peat fresh from the bog in a solution of caustic alkali; it is then dried and ground.

Contrary to the general opinion of writers on agricultural chemistry, that the atmosphere and water are the sources from whence vegetables derive their carbon, I entertain the opinion, that they would at all times take up a large proportion of their carbon by the roots, whenever it is presented in soluble compounds, such as organic matters, dissolved by means of alkalies, in which condition it has been found, by actual experiment, that growing plants do take up and assimilate the carbon of such compounds, when they are applied in a suitable form.

In the substance I have now the honour of submitting to your notice a very large portion of the inert peaty matter, described by Liebig, as being so difficult of treatment and slow of change, is rendered soluble by the process I have described; not only so, but the remaining organic matters are in a condition to undergo rapid change. We have in this powder from 50 to 60 per cent. of organic matter combined with salts of soda, and nitrogenous compounds soluble in water, this, surely, cannot fail to become a most important addition to our list of artificial manures. Sea-weed treated in the same manner yields still more remarkable results.

Trusting to be excused for this digression, I will return to the subject of charcoal. Some of the sawdust charcoal, of which a sample is on the table, has been manufactured into gunpowder of very fine quality, but, strange to say, there is little probability of its being generally used by powder manufacturers. With one honourable exception, all those whose attention I have called to this article, have declined to use it, or to adopt sawdust as a material for the manufacture of charcoal. One firm informed me that they never introduce any novelty until it has been fully approved by the Government; another used only elder; others restrict themselves to oak, willow, or dog wood, for the manufacture of charcoal, each firm enjoying the opinion that no other wood is fit for making powder of superior quality but the special kind they individually use; and then, why should they make any alteration, for their fathers and grandfathers did the same before them. This will serve to show the difficulty that sometimes exists in introducing novelties, and getting them adopted by established manufacturers.

In conclusion, I trust I have furnished you with some points for discussion, which I consider the principal object of this paper.

Should it be my lot, in the ordering of an All-wise Providence, to be made the humble instrument of developing the resources of our bogs and other unapplied and unappreciated products, to assist in raising the people of Ireland to a just appreciation of the vast mines of wealth that abound in their favoured land, it will be a source of satisfaction to me to the latest period of my life, independent of any pecuniary advantage I may derive.

DISCUSSION.

The Chairman said the subject which had that evening been brought under their notice was deserving of the serious consideration of the members of the Society, and he hoped, if perfectly carried out, it would lead to very great results. He trusted that a discussion would take place upon it, from which something would be elicited which would ultimately be of service to the community at large.

Mr. Yarrow, as engineer to the Irish Amelioration Society, incorporated by royal charter in 1847, for reclaiming and utilising the bogs of Ireland, would briefly state the results he had arrived at. He divided the subject into three heads:—1st. The chemistry of peat, which comprised the manufacture of paraffine, naptha, ammonia, and volatile oils; 2nd, the conversion of peat into charcoal, for sanitary, agricultural, and manufacturing purposes; and, 3rd, the solidification of peat for fuel. The chemistry of peat he should dismiss in a few words, for, however interesting the various processes might be as a matter of science, in practice they had not been commercially remunerative. As a fuel he considered a wide field existed, but, as he observed Mr. Gwynne present, who had devoted considerable time and attention to the production of an economical fuel from peat, he would leave that important subject open for that gentleman to speak upon, and confine his remarks to charcoal prepared from peat. The society with which he was connected had established works upon the Bog of Allan, and for several years had converted many thousand tons of peat annually into charcoal, which had found a ready sale in England for many purposes; and he might mention that ten tons of charcoal had been forwarded yesterday, with the Government stores, by the society for use in the military hospital at Scutari. The principal use of the charcoal, however, appeared to be when applied in a filter for the purification of town sewage. He referred to a model of a sewage filter that had been constructed by himself at Aylesbury, in Buckinghamshire, at the cost of Lady Frankland Russell (a member of the Society) and to whom the public were indebted for thus practically solving the great question of purifying the sewage from populous districts. The size of this filter was six feet by ten feet, and the section of the town thus purified contained two thousand people. The sale of the charcoal manure not only covered every outlay, but left a handsome surplus. The filter used was a modification of the one brought before the notice of the public by his Royal Highness Prince Albert (the President of the Society of Arts), about four years since; and in the case of Aylesbury and many other towns had been found to act most effectually. He concluded by expressing his firm opinion that the merits of peat were but even now imperfectly understood, and it was only by scientific investigations similar to these so ably conducted by the author of the paper read that evening, that correct conclusions could be arrived at.

Mr. Reed remarked that the town of Aylesbury had unfortunately given another proof of being two centuries behindhand. The beautiful apparatus alluded to by Mr. Yarrow had been destroyed; whilst the same was in operation, the public could travel over that part of the road with comfort and satisfaction. They had now diverted that most offensive drain across the road, and its contents were discharged into a field on the north side of the road, at a distance, he should say, of not more than 200 yards from the high road, which rendered the atmosphere in the vicinity of it of the most offensive character; whereas, when the filtering apparatus was in operation, not the slightest taint in the air was perceptible to the passers-by. He thought, therefore, if through the information given by Mr. Yarrow, the local Board of Health should be induced to re-erect this admirable apparatus for purifying the air, one very important result would be obtained from this meeting, which he was sure would give infinite satisfaction to the 6,000 inhabitants of the town of Aylesbury.

Dr. Booth inquired of Mr. Longmaid what was the cost of the sulphuric acid for the preparation of one ton of charcoal; also the additional expense of labour, and other matters, that the subject might be placed practically before the meeting in a commercial point of view.

Mr. Longmaid replied, that the cost of sulphuric acid for a ton of charcoal would be 3s. or 3s. 6d., and, possibly, the sulphurous acid might be recovered and used over again. He was not able to state that positively, but he thought it capable of being carried out. With regard to the other matters of cost in the manufacture of the article, the peat was taken wet from the bog and put into a tank with the acid. As soon as it was saturated it was passed through rollers, fitted to form it into blocks, something of the shape of bricks. These were afterwards placed in a drying chamber. The whole expense was very trifling indeed. He should say the charcoal might be made by his process at a cost of not more than 10s. or 12s. a ton. He supposed the selling price in London would be from £3 to £4 per ton.

Mr. Yarrow said the market price was about £3 per ton, and the Irish Amelioration Society had found that the cost upon the bog was from £1 to a guinea per ton. The remainder of the cost was made up of freight and other expenses, and the manufacture, so far as his own experience had gone, had not been remunerative at £3 per ton.

Mr. Gwynne stated that he would avail himself of the invitation of the Society, to make a few remarks upon this important subject. He had listened with great interest, and he hoped with profit, to the able paper read by Mr. Longmaid—who had informed the meeting of a great variety of purposes to which charcoal, both from wood and peat, might be applied; but he wished to mention a few others which Mr. Longmaid had not named, more especially with reference to peat and peat-charcoal. For sugar-refining purposes, peat-charcoal, when carbonized and reduced to powder by certain processes, and mixed with phospate, sulphate, and carbonate of lime, sulphate of soda, other alkaline carbonates, sulphate of alumina, baryta, or siliceous sand, would be found equal in effect to the animal charcoal at present used for that purpose. It was applicable to the manufacture of pigments and paints, of blacking, the purification and clarifying of syrups, the cleansing, decolouration, and refining of oils; the filtering and cleansing of chemical preparations, medicaments and decocting, the filtering and purification of water, for arresting decay and decomposition of animal and vegetable matters, &c. It was also applicable to the manufacture of gunpowder; carbonised peat might also be combined with bituminous matter, Venice turpentine, coal-tar, solution of glue, linseed oils, gums, &c., giving it tenacity and rendering it capable of being formed into ornamental articles, such as picture-frames, mouldings, embossed surfaces, images, statuettes, &c., &c. Embossed surfaces might be produced by pressure from suitably cut dies or plates, heated or not, as required. In carrying out these various objects, profitable employment would be afforded to many individuals; but every object for which peat or peat charcoal could be used, dwindled into insignificance when compared to the three great purposes to which it could be beneficially applied—viz., gas, steam, and household purposes; and, greatest of all, the smelting of iron and other ores. Mr. Mallet, in the introduction to his pamphlet, "On the Artificial Preparation of Turf," published in 1845, says, "The mass of fuel in the bogs of Ireland is too great and too valuable to be wasted and lost by a rude method of getting a scanty crop from the surface. If all the bogs in Ireland capable of being made into turf be taken as low as two millions of acres, and at an average depth of three yards, the mass of fuel which they contain, estimated at 550lbs. per cubic yard, when dry, amounts to the enormous sum of 6,338,666,666 tons; and taking the value of turf, as compared with coal at that ascertained in the following pages—viz., at 9 to 54—the total amount of fuel in Ireland is equivalent in power to about 470,000,000 tons of coal, which, at 12s. per ton, is worth above £280,000,000 sterling." There are three millions of acres of bog in Ireland, at an average depth of 19¼ feet, but taking it at two millions of acres, at only 12½ feet deep, there would be 6,972,000,000 tons of air-dried peat. One ton of solidified peat was of more value than one ton of coal, and that 6,972,000,000 tons of air-dried peat could be made into 4,648,000,000 tons of solidified peat, which, taken at 10s. per ton, would give £2,324,000,000 sterling as the value of two millions of acres of Irish bog.

Mr. H. P. Stephenson said there was one point upon which he could not agree with Mr. Yarrow, and that was with regard to the employment of charcoal as a deodoriser of the sewage of towns. He thought when they considered that the cost was about £3 per ton, the expense would hardly admit of that article being extensively used for that purpose, especially as the method of distributing the liquid manure by the hose and jet, was, in his opinion, more economical. The experiments of Mr. Jasper Rogers had satisfactorily proved that peat charcoal was a perfect deodorizer, but at the same time he thought, on economical grounds, it must give way to the system of steam pumps and the hose and jet.

Mr. Yarrow said it was well known that Croydon had always been the pet town of the Board of Health, and every known improvement had been carried out there, the whole of the sanatory works being completed under its sanction. In Croydon there were about 600,000 gallons of sewage per day, and they had had the best advice as to the means of conveying it away; but notwithstanding all the advantages they possessed it had been ultimately determined to use charcoal filters. An advertisement had recently appeared in the papers for sixty tons of peat charcoal per month, and the manure produced might be taken on the average at double the quantity of charcoal used.

Mr. W. Fothergill Cooke said, landed proprietors in woodland districts had of late years cleared a considerable portion of land of the cumbersome hedge rows, with a view to improvement in cultivation. The hedge rows in Hampshire were sometimes 50 or 60 feet in width, instead of only two feet, and when these were cleared away a large mass of roots and stumps had to be grubbed up, which were almost valueless. The clearing of the ground was generally paid for by measurement, and the raising of two tons of roots and stumps would cost about 10s. on the average. If any one present could state any practical method of rendering the roots valuable, he would confer a great benefit upon a large class of the community. He believed by the time he had completed his operations, he should have 600 tons of those roots lying useless, and which at present he should almost be glad to dispose off for the mere carting off the land.

Mr. Charles Bernard said he had understood Mr. Longmaid to express an opinion opposed to that of many writers upon agricultural vegetation, that carbonaceous matter was only taken up by growing plants from the atmosphere. All writers on agricultural matters now acknowledged the fact, that when the carbon was made soluble by potash, or combination with lime, the carbon was taken up by growing plants. Then, with regard to the application of charcoal to manufactures, it was to be lamented that manufacturers were very often slow to adopt improvements, but they could not so much wonder at that slowness when they considered the many thousands of pounds that were invested in a business, the profits upon which depended upon the observance of the most exact regularity, and the introduction of any new process might for a length of time materially damage the profits of the concern. He made that remark as an apology for the manufacturers. According to Mr. Longmaid's statement, there was only a difference of 8s. upon £3 10s.; the price would still, he thought, interfere with the use of charcoal as a deodoriser to any extent at a distance. He considered the true value of Mr. Longmaid's patent consisted in the use of the charcoal on the spot for smelting iron; but it must be left to practical results to determine its value.

Mr. Longmaid said, he thought the gentlemen who had just spoken was labouring under a misapprehension. It was not a difference as between 8s. and £3 10s., but the fact was, he could produce an article which sold at from 50s. to £8 a ton, at a cost of 10s. to 12s. a ton. He believed the whole cost by his process would not exceed 10s. or 12s. per ton. With reference to the object mentioned by Mr. Fothergill Cooke, he (Mr. Longmaid) thought there would be no great difficulty in converting the roots of trees into charcoal by the process he had described that evening, or at least there was no great difficulty in it which might not be overcome. Of course, it was not so easy to saturate the organic matter in a solid lump as when it was in a state of subdivision; but it might be done by a process similar to that adopted in creosoting railway sleepers and other timber. By this plan, the timber was placed in air-tight chambers, the air was then exhausted, and the pores of the wood being by that means laid open, they became susceptible to the steeping process. The acid could then be injected into the pores of the wood;—which when dried would become charcoal.

Mr. **Scott** wished to offer to the meeting the result of his experience as to the application of powdered charcoal as a dressing for potatoes. He could state that during the years 1846-7-8, when the disease of that root was most prevalent throughout the United Kingdom, his crop of potatoes in Cheshire, which had been dressed with charcoal, was comparatively free from disease. Charcoal was well known to be most useful as a deodoriser. He had used it in his stables, and it was known that nothing was more injurious to a horse than the smell of his own house, but the charcoal had the effect of rendering the stables sweet and wholesome, and after it had performed that office it was available for manure. Mr. Longmaid had referred to the immense tracts of bog land in Ireland, but he (Mr. Scott) could state that the working of it had never yet been found to pay those who engaged in it. He had had an extensive acquaintance with a space of 150 square miles of bog, but he had always found them to be convex and never concave, and for the most part on high ground. He could say he never saw a concave bog. With regard to the advantages of converting wood into charcoal, they were at present extremely problematical. The peat bog for fuel was worth, perhaps, from £6 to £8 per acre, whilst the land was prepared for reclamation, but when converted into charcoal, it had never yet, he believed, been found to pay, and therefore it was hardly fair to characterise this as one of the unappreciated and undeveloped resources of Ireland. He made these remarks not with a view of conveying information upon the subject under discussion, but merely to remove what he thought might leave an erroneous impression on the minds of those present.

Mr. **Longmaid** said he could account for the growth of the bogs in the form which the last speaker had described. Although they eventually became dammed up in natural basins, that did not interfere with the formation of the peat, high in the centre and lower towards the edge of the basin. In Dartmoor there were extensive bogs, and during the last great war with France, a large extent of surface was cleared away and the gravel laid open; that was now again covered with bog, which had grown since 1815, and some of which had been recently removed.

Mr. **Gwynne** thought he could reconcile the disparity in the statements, with reference to the formation of the bogs. He believed he was correct in saying that they were generally about 200 feet above the level of the sea, but although they were so much elevated, yet some of the bogs were in basins, some of them forty feet in depth. With regard to the use of peat and its value in Ireland, he differed in some respects from Mr. Scott. There were upwards of 3,000,000 of acres of bog in Ireland alone, and at the rate they were now using it, it would yield a supply for 2000 or 3000 years to come, and therefore it could not be said that at present they were using it to any great advantage; and with regard to its application to the manufacture of the best qualities of iron, the ironmasters need be under no apprehension of a lack of that commodity for centuries to come.

Mr. **Park** said he had for several years taken an interest in this subject, and he must say he thought the matter had been treated by Mr. Longmaid in a legitimate manner, still he would say the application of charcoal as a manure had not received sufficient attention. There could be no doubt that calcined peat was the best known medium for conveying manure to plants. It was light and capable of application in various ways, and any vendor of manure, upon being informed of the nature of the soil, would recommend that kind of manure most suitable to be used, under the circumstances, in combination with charred peat.

The **Chairman** said that Sir Robert Kane had been instructed by the Commissioners of Woods and Forests to investigate this subject, and that gentleman had come to the conclusion that there were products to be obtained from peat which would ultimately produce the most important results to the mercantile community of this great and enterprising nation. Sir Robert Kane, in his report, gave the result of his consideration of a patent which was taken out by Mr. Rees Reece, and in that report he stated that all the products to which Mr. Rees Reece laid claim were capable of being produced, having tested the experiments in his own laboratory, and obtained the same results. The only difference between Sir Robert Kane and Mr. Reece was as regarded the cost of obtaining these products. He thought the paper they had heard that evening was calculated to do great good to society at large; and the man who was the means of eliciting discussion upon so important a subject deserved to be placed in the first scale of society, and amongst the benefactors of his race; therefore, he felt that the gentleman who had introduced the subject was deserving of their best thanks. They were also much indebted to Mr. Gwynne—a gentleman who had taken great pains and had laid out a large amount of capital in bringing forward the products of his native country—in which, it was gratifying to find, he had been so eminently successful. He felt bound, from the knowledge he possessed of Mr. Gwynne, to pay that deserved tribute to his exertions.

Mr. **Scott**, in explanation, stated that he did not intend to convey the impression that nothing was realised out of the Irish bogs, but he meant to say that up to the present time the operations had not been of a remunerative character to those who engaged in them.

The Secretary announced that the Paper to be read at the next meeting, Wednesday, January the 31st, was "On the Chalk Strata considered as a Source for the Supply of Water to the Metropolis," by Mr. S. C. Homersham.

Also, that on the evening of *Friday*, the 2nd of February, there would be a Special Meeting, when Mr. Leone Levi would read a short Paper, "Observations on the Proposed Congress for the Improvement of International Commercial Law," as introductory to a discussion on that question.

INSTITUTE BOOK ORDERS.

December Account.

	Full Price.			Red. Price.		
	£	s.	d.	£	s.	d.
Bridgwater, Literary and Scientific Institution	6	7	6	4	0	4
East Retford, Literary and Scientific Institution. . . .	0	17	5	0	13	11
Gateshead, Washington Chemical Works Reading Institution and Library	4	2	0	3	2	1
Liskeard, Institution . . .	1	17	0	1	8	1
London, Bank of England Library and Literary Association . .	6	15	0	5	1	11
Louth, Mechanics' Institution .	14	1	0	10	13	6
Nailsworth, Literary and Mechanics' Institution . . .	5	3	6	3	19	11
Portaferry, Mechanics' Institute .	13	1	1	9	18	0
St. Ives, Institution . . .	7	15	11	5	17	8
Sevenoaks, Literary and Scientific Institution	2	4	4	1	12	0
Shaftesbury, Literary Institution	1	13	6	1	6	3
Stamford, Institution . . .	1	2	6	0	18	5
York, Institute of Popular Science and Literature	5	19	0	4	12	3
	£70	19	9	£53	5	11

Being a saving of £17 13s. 10d., or about 25 per cent.

THE FACTORY SYSTEM IN THE UNITED STATES.

There was lately opened at Lawrence, Massachusetts, a New Hall, in connection with the Pacific Mills, which is quite a new feature in the factory system. Here it is expected that during each week there will be provided, free to all of the operatives of these mills, a lecture or a concert, or some pleasing and profitable exhibition. It was hoped that the future would prove the existence of *sympathy* for the interest of all engaged in the service. On the occasion the operatives assembled to the number of 800, and were addressed by Mr. W. Chapin, the resident agent of the corporation, who proceeded to describe some of the distinctive features of the Pacific Mills. The *library* contained 1500 carefully-selected volumes, 500 of which were in constant circulation. This was open to all on the payment of a single cent each week. Then there was the *Relief Society*, which was essentially peculiar to this establishment. Every one of the employed, over 14 years of age, is required to give from his wages two, four, or six cents per week, unless the fund become too large; and in case of sickness he has proper medical attendance, of his own choice, free of expense, and a proportionate allowance of 1 dollar 25 cents to 3 dollars 75 cents per week during sickness, even if it should extend to six months. 125 persons had received the benefit, and upwards of 1,100 dols. had been distributed, while no one person had contributed more than a single dollar to the fund. The *Savings Bank*, connected with the cashier's office, where sums from five cents to 100 dols. and more, were received, and an annual six per cent. interest allowed, was distinctive, yet it was gratifying to know that this corporation was not alone in adopting such a means of good to its workpeople. Upwards of 10,000 dols. had been deposited by the operatives in six months. The *Boarding Houses* contained unusual provisions for health and comfort, but were susceptible of improvement. Mr. Young, treasurer and general agent, then made a few remarks, averring that there was proof that a corporation sometimes has a soul.

GUNNERY.

By Lady Bentham.

A given force can only originate a corresponding amount of motion, and that whether the motion be absorbed by a single operation, or whether that motion be divided in the production of two or more different operations. This axiom applied to gunnery is wholly in favour of the principle of non-recoil, for it is evident that if a part of the force consequent on the explosion of gunpowder be employed for causing the gun itself to recoil, that portion of force is abstracted from that which would otherwise be employed for the expulsion of a missile.

At the present day there appears to be a general tendency towards the doing away with recoil, by giving great weight to the gun itself, which certainly would effect the purpose; but there seem to be two objections to this mode of preventing recoil; the one that of consequent expense, and the other—an important one—the dead-weight of a piece of artillery sufficiently ponderous to resist recoil. In fortified places on shore it is true that this objection is of little moment, but it is not so either in the field or on shipboard, as in both these instances the amount of force employed depends entirely on the dead-weight of the ordnance that can be carried into action; a truth which, though apparently self-evident, needs frequent repetition ere its importance is likely to be duly estimated.

Hitherto the science of gunnery has been in a manner stationary, but now a spirit of investigation has been roused in regard to it, and very recent inventions have been tried on a large scale, some of them promising good results; but what has been done by the Board of Ordnance has, with good policy, been kept as far as possible secret,wherefore no estimate can be made of their intended improvements. On the other hand, those attempted by the Lords Commissioners of the Admiralty are made public; in some instances more or less success has attended the introduction of novelties. The Lancaster gun, for example, carries further than any other piece of ordnance, but it is said to have the defect of liability to burst;—this is probably the consequence of some irregularity in the bore, which prevents ready escape of the missile. The Lancaster gun is also said to deviate from its intended aim, but that, as the deviation is constantly the same, it can be allowed for; this error, doubtless, originates in the manner of rifling the interior of the piece, and would, without difficulty, be remediable. There can be no doubt that the principle of the rifle is as applicable to large artillery as it is to small arms.

The particular form of shot best suited for its propulsion, and for its subsequent passage through the air, has not yet been decided on. Sir Howard Douglas first indicated an ovate form, and since then different modifications of it have been adapted to small arms; but if the principle be good for them, it can be no less so for missiles of a greater diameter and weight. Experiments would, however, be necessary to ascertain whether a shot should be ovate, oblong, pointed, or of any other shape. Unfortunately experiments, in most instances, have hitherto been confined to the ascertaining of the superiority of one thing over another of the same description, whereas experiments of an exhaustive nature would usually be attended with little more expense or trouble than partial ones.

As to non-recoil, so long asordnance is placed at the embrasure of a fortress, the piece must of necessity recoil for the purpose of reloading it; but in all other situations this is needless. On shipboard it was at one time alleged that those who served a gun would be exposed in loading it to the enemy's fire; this danger was obviated by Sir Samuel Bentham, by his substitution of a *rope* ramrod for the usual inflexible one, and, in point of fact, even less than the average number of casualties were experienced in the many vessels armed on the principle of non-recoil. The Berwick smacks, and other coasters, so armed at his suggestion, lost not a single man in action, though some of them had to encounter, and drove off, privateers of much superior force and bulk. It has been already said in the *Journal of the Society of Arts*, that why non-recoil was discontinued could never be discovered, and Mr. Bridges Adams, in a subsequent number, suggested various reasons for this desuetude. They might all of them have had their influence, but the chief cause would seem to have been the inappropriate fitting of non-recoil ordnance by the Navy Board; that board having objected to Sir Samuel's interference in this matter, and ordered non-recoil guns to be fitted according to a model. At that time the ports of a vessel varied, perhaps, a foot or two in their height from the deck, so that a chock was often necessary to raise the gun-carriage to a proper height, but the Board made no provision for such cases.

The principle of non-recoil will doubtless soon be very generally adopted; the principle being identical, whether it be exemplified in Sir Samuel's mode, namely, by attaching the ordnance by a breeching to the strong timbers constituting the frame of a vessel, whether by the dead weight of the gun itself, or by any other means; it must, however, be kept in mind, that in certain cases, the principle cannot be introduced so long as guns continue to be loaded at their mouth, for instance, in fortifications where the embrasures are but little larger than the piece itself; hence arises the expediency of devising a good contrivance for loading artillery at the breech. Whenever this desideratum shall be achieved, the embrasures of fortifications, and the port-holes of ships, may be safely contracted, and even covered by a moveable screen to protect the men, save only an opening of the diameter of the bore of the gun.

A notion is very generally entertained that the *whole* of a vessel carrying heavy ordnance must be proportionately strong, but experience in actual warfare has proved that any vessel that can bear a sea is strong enough to carry heavy artillery, provided the gun itself be duly supported. For example, in the Liman of Otchakoff, in the action of the 7th of June, 1788, according to General Fanshawe's account, there were five men-of-wars' *long boats*, which had been armed by Sir Samuel Bentham with "each an 18-inch howitzer in the stern."—See *United Service Journal*, 1829, part 2, page 334. The Russian flotilla which vanquished the Turkish fleet on the 17th of the same month, consisted wholly of small vessels, not intended for warfare, and the largest of which had conveyed the Empress Catherine II. and her suite down the Dnieper, but Sir Samuel had strengthened them under those parts intended to receive artillery. It was this flotilla that took, burnt. or destroyed nine ships of the line, as already noticed in the *Journal of the Society of Arts* for August 25, 1854. General Fanshawe, in his letter to General Conway, has related in regard to the Turkish fleet, that "nothing could present a more formidable front than this line, extending from shore to shore, in numbers ninety-six sail, so thick that an interval could scarcely be perceived between their sails; whilst our diminutive force did not reach either shore by above two miles, and might with equal advantage have been attacked on both flanks." * The whole of the article from which the foregoing is extracted might be well worth study by all persons interested in naval warfare, especially if to be carried on in shallow water.

Sir Samuel, in giving an account of that flotilla to the editor of the *United Service Journal*, August, 1829, prefaced his letter by the following observation:—"This engagement affords, in my view of the subject, an additional degree of interest, as evincing the splendid results which may be obtained by the employment in naval warfare of *shells*, *carcasses*, and shot of the *largest* size, when fired point-blank from vessels drawing little water against ships of the largest size, points which I have for more than thirty years past never failed to point out, and recommend on every occasion when there offered a chance of drawing attention to the subject." It may be added that shells, though now of such general use in naval warfare, were strenuously resisted by the naval authorities till within the last five-and-twenty years, which, together with the general adoption of all Sir Samuel's principal improvements in naval architecture, can hardly fail to inspire confidence in his opinion as to the superiority of vessels of war drawing but little water; but he had to combat received notions, supported, as they were, by our almost universal success at sea. Indeed, he had had very unusual experience in naval concerns, since it had fallen to his lot to build sea-going vessels, to man the above-mentioned flotilla, and also to command it, and to conquer with it a far superior fleet in point of bulk, and of the usually considered requisites for naval superiority.

The long peace we so happily enjoyed necessitates the going back for examples to a period long since past, but the practice of Sir W. Sydney Smith will be accepted as powerful evidence in favour of non-recoil. This distinguished and successful officer had witnessed, off the coast of France, the armament of some of the experimental schooners, with non-recoil guns. Sir Sidney adopted the principle, and made good use of it in his noted defence of Acre against Buonaparte, then in the plenitude of his military successes. Mr. Spurring, the draughtsman who had been employed by Sir Samuel in those experimental vessels, was in the *Tiger*, Sir Sidney's ship, and her carpenter, Mr. Bray, was remarkably intelligent; to him Sir Sidney confided the works on the breech tower of Acre, the defence of the town gates, and the fitting of a floating battery. Mr. Bray's description of the manner in which these several works were executed was transmitted to the Admiralty on the 25th November, 1803, of which the following is an abstract:—"The two 68-pounder carronades used at the siege of Acre were fitted in two djerns," (a species of barque of five or six tons burthen drawing very little water), "on the non-recoil principle. The slide of the carronade was first taken away, then the carronades were fixed with their beds, the spindle being let through a platform made in the djerns and forelocked, so that the carronade could be turned round in any direction; after which another bed of timber was brought on the first to form a support against the breech of the bed, and take off part of the strain from the spindle. Those guns did material execution, frequently dismounting the enemy's guns in their batteries, from some of which the djerns were distant about a musket shot, and from others a pistol shot. I have with nine men fired seventy-five rounds from the two carronades in twenty minutes during the siege."

This fact, it may be observed, affords an example of one of the great advantages attendant upon this principle, namely, the great rapidity with which it enables ordnance to be fired, though served by less than half the usual number of men; and Mr. Bray further says, "Sir Sydney Smith was present when I worked *five* guns, fitted as before mentioned, with *eleven* men only.

"I also fitted" Mr Bray adds, "a long 24-pounder in the stern of a vessel of a different construction from a djern. * * * The breech was bedded on a coil of new rope. The gun threw shells to a great distance, and on one side of this long gun was fixed a 32-pounder carronade, and on the other a 42-pounder brass howitzer, on the same principle, secured to the transom of the vessel.

"I also fixed another 42-pounder brass howitzer on the breech tower, for the purpose of battering down the aqueduct walls to fill up the entrance to the French mine, and many other guns during the siege, all of which were essentially useful, and did great execution.

"After I had fitted all these guns on the non-recoil principle, Sir Sydney Smith confided the defence of the town gates to me at the djerns, * * * which effectually prevented the enemy's approach to the gates. The djerns in which the guns were placed were *old* and of *weak* construction, nevertheless they were not materially affected by the shock, except making them a little leaky towards the end of the siege, which lasted sixty days, although I kept up an incessant fire, particularly during the times when the enemy stormed the town; and then our expense of shells was so great, that I was obliged to fill shells in the central djern, which served us for a magazine; and such was the enemy's fire on these vessels, that they have been set on fire with hot shot from the enemy several times in the day."

At the same time that Mr. Bray's "Memorandum" was transmitted to the Admiralty, their Lordships were furnished with sketches of the manner in which he had fitted the ordnance in question, engravings of which may be seen in Sir Samuel's "Naval Papers," No. 7, pages 34 to 37. It appears that the 32-pounder fitted at the English battery on shore at Acre, was supported by ground-pieces of *fir* timber, about 8 inches by 9 inches, let into the ground, then planked over with 3-inch planks. On board the djerns, 43 feet long by 15 feet broad, the platform on which the ordnance was placed was made of rough balks, about 8 inches by 9 inches, crossing each other, and pegged together, but not fayed. The three pieces of ordnance mounted on board a kind of lighter 40 feet long, 15 inbreadth, had shores against the trains of their carriages to prevent recoil.

That Bonaparte was baffled in his designs upon Acre is matter of history, not of a Journal of Arts, but the means by which Sir Sydney Smith effected the discomfiture are within the province of a Society of Arts. Sir Sydney, abandoning routine, adopted a mode of mounting ordnance which he had seen to be effective, and he employed vessels to carry it, which, according to received notions, were wholly unfit for such a service, in the essential points of size, of draught of water, and of strength. Under existing circumstances, the vessels he armed for the defence of Acre seem to afford a very useful example, for they are convincing proofs that very small craft may be easily strengthened so as to bear heavy artillery, and that under nearly constant fire for a period of forty successive days; consequently, in the course of two or three weeks, existing small vessels might be fitted for sea, they being an armament which could not but be effective against a powerful enemy, and which to work require less than half the usual number of men.

---

* "United Service Journal," 1829, part ii., page 335.

It may seem unjustifiable thus to persist in advocating the inventions of Sir Samuel Bentham, but in its justification some peculiar circumstances should be considered, such as that the public department in which he served keeps no register of improvements in it, nor of their authors, nor any index of proposals for its amelioration, so that what does not happen to be brought before the Board of Admiralty of the present day is unknown to it. Sir Samuel Bentham, too, was at least half a century in advance of the age in which he lived, and in addition to science, he habitually employed reason and common sense in all his investigations. At all events the articles published in the *Journal of the Society of Arts* relating to his inventions have elicited observations from many quarters as to gunnery, which cannot fail to elucidate that science, and to contribute to the success of our arms against a formidable antagonist.

8th January, 1855.

Home Correspondence.

ON THE OILS AND OTHER VEGETABLE PRODUCE OF BRITISH HONDURAS.

Belize, British Honduras,
Dec. 15th, 1854.

SIR,—I beg to acknowledge the receipt of your letter of the 1st of November, and thank you much for the obliging terms in which it is expressed. I have also received your Journal of November 3rd; that of the 26th of October has not come to hand. I have perused Mr. Wilson's letter, which does not at all discourage me, or cause me in the slightest degree to relax my efforts to make the cahoun oil more generally known and used by the British public. Notwithstanding Mr. Wilson's opinion respecting the merits of that oil,—without presuming to differ from him upon a subject to which he has devoted so much attention,—from all that I have read, and seen, and heard, I have arrived at the conviction that cahoun oil is destined at no very distant date, to take the highest rank amongst vegetable oils. Mr. Wilson (very naturally) forms his opinion from the specimen which was sent to him. But I warned your readers that the specimens which I had the honour of forwarding to you, were not to be regarded as fair representations of the cahoun oil, because they were manufactured in a very imperfect and unscientific manner; nevertheless, the manager of the British Sperm Candle Company places it,—so far as it is applicable to the manufacture of candles,—in a higher niche than the best cocoa-nut oil.

Mr. Wilson says, "The cahoun oil will not be found for manufacturing purposes, whether for soap, candles, oil, or grease, worth more than the fine cocoa-nut oil of the Malabar coast, which comes to this country in large quantities."

The general manager of the British Sperm Candle Company gives a practical opinion upon the subject, for, having actually made three candles from the oil which you sent to him, he says, "I consider the cahoun nut oil superior to cocoa-nut oil for making composition candles, for the odour is more pleasant and the compound is less oily," [that is, not so liquid.] "The *best cocoa-nut oil*" [including, I presume, the Malabar oil,] "is now selling in London at 51s. per cwt., and, I think, there would be no difficulty in selling the cahoun nut oil at a higher rate in very large quantities."

Now, here are two very different opinions expressed by gentlemen, both of whom are well acquainted with the subject on which they write, and each occupies too high a position to permit us to suppose for an instant that either of them would give expression to anything but a conscientious conviction. The testimony is conflicting: How is it to be reconciled? The manager of the Sperm Candle Company founds his opinion upon experiment. Mr. Wilson would appear to have formed his in the absence of such experiment; at all events, it is not in evidence that he made any. Under these circumstances I would say, *Utrum horum mavis accipe?*

But I am content to take the opinion of Mr. Wilson. He says that the cahoun oil, for the purposes which he mentions, will not be found *to be worth more* than the fine cocoa-nut oil of the Malabar coast. From this mode of expression, I think it may be inferred that Mr. Wilson is of opinion, at any rate, that it is *worth as much*. If, then, that be so,—if the cahoun oil and the Malabar cocoa-nut oil be placed upon the same footing as regards quality, with which can the English market be the most readily and cheaply supplied? The time occupied in the passage from Malabar to London, is, I suppose, from four to five months; the voyage from Honduras to England is performed in six or seven weeks. This circumstance, then, I should imagine, must give to the cahoun oil what may be termed a collateral advantage over the Malabar cocoa-nut oil, and, *cæteris paribus*, which is admitted, must render the former the more desirable commodity.

Mr. Wilson says, "the reason why Mr. Temple finds the oil expressed in Honduras," (I am sorry to say it is not *expressed,*) from the cahoun palm nut is superior to that from the cocoa palm nut is probably this:—The cahoun nuts being small and without milk, would be dried whole, and thus be protected by their brown skin from any risk of mould, which, without some care is taken, *the cocoa-nuts are liable to at the inside, and where broken.*" This is very valuable testimony in favour of the cahoun nut, and the fact mentioned by Mr. Wilson, undoubtedly gives it another advantage over the cocoa-nut. The shell of the cocoa-nut is, then, in proportion to its size, and is consequently easily broken. Falling from no very great height, its own weight would occasion it to be fractured. Not so with the cahoun nut. The shell of that nut is remarkably hard, and though probably not thicker than that of the cocoa-nut, the texture is altogether different. Then, again, being so much lighter and smaller, (the cocoa-nut being the size of a cannon ball, and the cahoun nut not larger than an egg,) it is not liable to so many accidents. The shell admits of a most beautiful polish, and is capable of being turned into a great variety of useful and ornamental articles. Mr. Wilson speaks of the *milk* of the cocoa-nut, I presume he means the water which that nut contains. This water, when the nut is taken from the tree early in the morning, and whilst the dew is yet upon it, is a cool and delicious draught. It is slightly effervescent and greatly aperient. The milk is made from the kernel itself, and in this manner the kernel is grated, a little warm water is poured over it, and the liquid is then filtered through an open cloth. This milk is excellent with coffee, and indispensable to a curry.

But Mr. Wilson gives me more credit than I deserve, in supposing that I derive my opinion of the superior merit of the cahoun nut by such a scientific mode of reasoning as that which he suggests. I will state in a few words why I think that the cahoun nut is, and must be, superior to the cocoa-nut. In the first place the cocoa-nut tree prefers an arid, sandy soil,—a soil in which nothing else will grow. Here it grows spontaneously—here it luxuriates. On the desolate beach, where no other tree or shrub of any kind, or patch of green presents itself to the eye, these trees are seen in groves, their branches waving in the wind like the nodding plumes of a hearse; and, as the gale sweeps past them, giving utterance to wailing, melancholy, funereal sounds. There is something indescribably solemn and ghost-like in the appearance of a large avenue of cocoa-nut trees on the sea-beach by moonlight, more particularly if there be a fresh breeze blowing at the time. The cahoun tree is found only on the most fertile land. It is never to be seen on the sea coast, nor within eight or nine miles of it. Where this tree grows there is the richest pasture—there plants and fruits of every variety flourish in great profusion—there you see flowers of surpassing beauty and fragrance—and there also birds of the brightest plumage. Well, then, we have it on the authority of Lucretius that, "ex nihile nihil fit," and a greater authority has said, "Do men gather grapes of thorns, and figs of thistles?" What inference do I draw from this? Simply, that as the cocoa-nut tree derives its nutriment from a sandy, sterile soil, where nothing will exist, and the cahoun tree receives its sustenance from the richest materials, the fruit of the latter must be very much superior to that of the former. This is one reason why I think more highly of the cahoun-nut than of the cocoa-nut. There is another. If you chew a portion of the kernel of the cocoa-nut the flavour is agreeable, and the process of mastication produces in the mouth a lacteous substance. But if you submit the kernel of the cahoun-nut to the same dental process, the result is a positive oil. But the strongest argument in favour of the superiority of the cahoun-nut is the broad fact that one bottle of the oil extracted from it will burn as long as two bottles of oil made from the cocoa-nut. The trunk of the cocoa-nut is very lofty, and the branches grow only at the top. The cahoun is much shorter, and the branches commence at the root. These *branches* contain so much oil that, when a tree is cut down, they are eagerly devoured by the cattle. It is a singular circumstance that the bees generally select the top of the cahoun trees in which to build their hives and deposit their honey.

Mr. Wilson says that he had a conversation with an intelligent gentleman from Venezuela, who knew the cahoun oil well, and spoke highly of it. If the cahoun tree grows in Venezuela, it is rather remarkable that Humboldt, in his account of that country, makes no mention of it. I am glad to find that, through the publicity given to cahoun oil by means of your Journal, a demand has already been created for that article. Messrs. Hyde and Company, one of the oldest mercantile houses connected with Honduras, possessing a large capital, and animated by a warm desire to develop the resources of the country, and contribute to its general prosperity, have determined to give their aid to a more extensive and more perfect production of cahoun oil. Mr. Travis, the representative of that firm, has communicated to me the following extract from a letter addressed to him by Mr. Hodge:—

"The high price for oil in consequence of the Russian war, has caused a demand for cocoa nuts and oil, and we have also inquiries for cahoun nut and oil. As an experiment we have promised to bring here five tons of cahoun nuts in the shell, which please ship in one of our own vessels for London. Should it succeed we shall send machinery for crushing, &c. Please state the cost and every particular."

Mr. Travis writes to me as follows:—"We informed them in answer that there are abundance of cahoun nuts, but our difficulty will be labour, as this country is so thinly populated, and labour high. In time, if the men living on the banks of the rivers find that they could always sell the cahoun nuts in Belize, a steady supply would be obtained, which would increase every year."

Mr. Sheldon, the head of another highly respectable house connected with Honduras, who sails for London by the present packet, has also resolved to try the experiment. He has directed ten tons of nuts to be sent to him.

I have sent to England by this packet, in order that they may be forwarded to you, ten bottles of cahoun oil, which I think will be found to be of a better quality than that previously transmitted. Perhaps you will be good enough to send one of them to Mr. Wilson. But even this oil, not being artistically made, is very far inferior to what it ought to be, and what it would be if it were properly expressed.

In a former letter I stated to you that the avidity with which every person in Belize, or connected with it, pursued the mahogany trade, had caused this fine country to be neglected, and had stifled every attempt to cultivate its soil and develop its vegetable wealth. The greatest discouragement has always been exhibited to any enterprise having for its object the replenishment of the earth. It appeared as if the curse of Cain had descended to his vocation. To talk of a spade was rebellion against the true faith, and the most distant allusion to a plough, caused people to nod and wink, and give dark hints about a strait waistcoat, though the morality of some of the people has not been particularly searched, yet they have ever manifested the strongest objections to the "rake's progress." The most amusing, and at the ame time, ridiculous reasons were sometimes alleged. One wiseacre once observed to me that agricultural operations in Honduras were impracticable because the *clay stuck to the feet*. This was almost as beautiful a *non sequitur* as that which is related of the traveller, who had no doubt that the town he was passing through in the early morning was Stoney Stratford, because he had never been so bitten by fleas in the whole course of his life as he had been during the previous night. I have before explained the real causes of this discouragement. It is true that the treaties between the crowns of Great Britain and Spain, whilst giving permission to the subjects of the former to cut mahogany and logwood, strictly prohibited any species of cultivation for the purposes of trade. But that prohibition had no share whatever in the inactivity and indifference of the people with respect to agriculture. The old mahogany cutters had too much of the spirit of their buccaneering predecessors, to be bound by any provisions contained in treaties, if their interests had appeared to them to lie in a contrary direction. Besides, the treaties which forbade cultivation prohibited also many other things, which prohibition was as little regarded by the government as by themselves. As the mahogany trade is becoming less and less profitable every year, or rather, I should say, more and more ruinous, the attention of the inhabitants is awakening to the importance of discovering some other staple which may occupy its place. This will not be a work of much difficulty, inasmuch as the soil is teeming with plenty, and the numerous rivers and fresh-water lagoons, not only supply to it a constant irrigation, but also a means of transit for its produce. I have lately read in the newspapers a discussion concerning castor oil as a remedy for cholera, and also a correspondence in which the writers complained of the very high price which was charged for that medicine. Now the *Palma Christi*, or castor oil plant, grows wild in this country. When it has once introduced itself into your garden, it grows with the pertinacity of the most determined weed, and it is almost impossible to extirpate it. Castor oil might, therefore, be made in this country in such immense quantities that the price of that inestimable drug might be reduced so low as to bring it within the reach of the poorest individuals, and whether it be a remedy for cholera (which appears yet to be a moot point) or not, it is unquestionably one of the most powerful, and at the same time harmless of purgatives, and it ought to be in every habitation, whether that habitation be a palace or a hut. There are some medicines the sale of which it would not be safe to entrust to any but the chemists, but there would be no more danger in a grocer dispensing that drug, than there is in his selling figs and raisins. If the grocers would admit castor oil as a regular article of their trade, it would confer a great benefit upon the poor.

It is not generally known that castor oil is the best oil for the hair, nourishing the roots, and giving it a beautiful gloss and a tendency to curl. Poor Elliott Warburton, in his most interesting book, "The Crescent and the Cross," describes the long, dark, shiny, clustering locks of the Nubians, and, if I mistake not, he ascribes the luxuriance of that feature to the profuse application of castor oil.

I have sent to you by this packet a box of the *mild* castor oil seeds of this country, in order that their value may be tested. I have also directed to be forwarded to you some bottles of Cayenne pepper, grown and manufactured by myself. This pepper will be found to be superior to the pepper which is generally imported from the West Indies, which, for the most part, is greatly adulterated with a red powder, which is found upon the flower of the Anotta plant. The pepper which I have sent, is made entirely of the small bird pepper, (the bonnet pepper, of which it is sometimes made, is inferior in flavour and less pungent,) which is dried in the sun, and then pulverized upon an Indian rubbing stone. This stone is unquestionably of great antiquity, being precisely the same as that which is represented on several Egyptian remains. It is used for grinding maize, or Indian corn, and is altogether different from the *quherne* of the Ancient Britons, which was employed for a similar purpose. There are many features and characteristics amongst the Indians of this portion of the American continent, which lead one to suppose that they are of Phœnician origin.

I now wish to bring under your notice a most valuable plant indeed, a native of this part of the world—I mean the *guaco*. This plant, although not altogether unknown to science, has not yet been admitted into the Pharmacopæia of London, of Edinburgh, or Dublin. It is a creeping plant, and grows wild in the bush, in moist places, and on the margins of pools and rivulets. The leaves, stalk, and root, are extremely bitter. Its medicinal properties are extraordinary. There will be no difficulty in believing that Honduras, abounding as it does in dense and interminable forests, is not without its due compliment of snakes. In fact, they are as plentiful as blackberries in England, or "as thick as autumnal leaves that fall in Valhambrosa," and they are, for the most part, extremely venomous. Rattlesnakes are very numerous, and there is a small snake, called by the Creoles, the *Tomagoff*, the bite of which is considered to be fatal. Where there are snakes (nature abhors a vacuum) there will be snake doctors, and we are not without a fair sprinkling of sable-skinned disciples of Esculapius; these professors are well acquainted experimentally with the virtues of the *guaco*. When one of them is called in, or rather called out, for the victim is almost invariably in the bush, to treat a snake bite, he, like more civilized empirics, has recourse to a good deal of mummery, such as crushing the head of the snake, (if it can be got) making an infusion of it, and giving it to his patient to drink, which is a proof that the doctrine of homœopathy is not unknown to the medical practitioners of these umbrageous recesses. But the real medicine which he gives to his patient, and which, when given in time, invariably performs a cure, so it is said, is a decoction of the leaf of the guaco. In a book styled "New Remedies Pharmaceutically and Therapeutically considered" by Dr. Dungleson, Professor of the Institutes of Medicine in Jefferson Medical College of Philadelphia, there is, at page 335, an interesting article on this plant, in which he describes the effects produced by it when administered in cases of snake bites, and Asiatic cholera. The article is too long to insert in this letter, but I should recommend your readers to an attentive perusal of it.

Dr. John Young, a very old and successful practitioner of Belize, has obliged me with some manuscript observations of his brother, the late S. Francis Young, who was a gentlemen of very considerable scientific attainments and medical skill, and who also practised for several years in this country. As they are extremely interesting, I am sure they would not be unacceptable to you,—therefore I do not hesitate to transcribe them:—

"The guaco is a creeping or climbing plant, growing in moist and shady parts of the forests of Central America, and delights in the rich black vegetable mould so abundant in intertropical forests. It is found in great vigour near the margin of springs, in shady situations, as well as along the banks of rivers. When in its growth it meets with a shrub, or any other body, it attaches itself to it by winding in a spiral manner round it. The leaves which have reached full maturity are about six inches in length, and of a proportionate width; and, at a little distance from the leaf-stalk, are sagittated and serrated. The leaves of middle growth, as well as the young ones, are of a dark purple hue, with a tinge of green on the under surface, an appearance by which the guaco is readily distinguished from other plants of the creeping or climbing kind, which may, in other respects, strongly resemble it. The upper surface is of a green, glossy, and silky aspect, and of a velvety feel, from being covered with a short and exceedingly soft down. The taste of the leaf, stalk, and root, is an intense bitter, which leaves a strong impression on the tongue, more lasting than that caused by the generality of bitters. It imparts its bitterness readily to spirit, and water; and is, therefore, administered internally in the forms of tincture, infusion, and decoction. It is universally had recourse to as an infallible remedy in cases of snake-bite throughout Peru, Central America, and Mexico, in all which divisions of the American continent it is known under one and the same name—guaco—by all tribes of the Indians, notwithstanding that there exists nearly 200 different dialects.

"So satisfied are all classes of people among whom this invaluable product of the vegetable world is known, of its extraordinary medicinal powers and specific virtues in cases of snake-bite, that every Indian or negro whose avocations cause him to traverse the western world, invariably has a supply of this friendly plant, in a dry or prepared state, to meet any accident that may befal him from his inadvertently placing his foot upon one of those dreaded and deadly foes of mankind. The writer has had four cases of snake-bite under his care, in all of which the guaco was used as the sole remedy, and with complete success.

"The first case was that of the mate of a vessel on board which a snake was supposed to have been taken in a hollow piece of logwood. While loading the ship's boat from the shore a snake frequently protruded itself from among the pile of logwood, and was frequently attempted to be killed by the sailors; it, however, with its natural dexterity, eluded every endeavour of theirs by as quickly retiring among the pieces of logwood, many of which were hollow, thus affording a secure retreat. In one of these pieces, there can be little doubt, it found its way on board. About eight o'clock at night, the mate, while walking the deck, on which a quantity of logwood still remained, suddenly felt something bite him near the ball of the great toe. The pain was exquisite, quickly extending itself in shoots up the limb, and affected his side. There was a giddiness of the head and an acute pain in the pit of the stomach, and sickness. He was almost immediately thrown into violent convulsions, and the posterior muscles of the body became so powerfully affected with spasms as to send the head and shoulders backward to such a degree as to resemble a severe case of tetanus. When my brother, who was hastily sent for, arrived on board, he immediately concluded it was a case of snake-bite, and was in the act of sending ashore for the *guaco*, a quantity of which, by good chance, he had, when I arrived with it, having heard of the mishap. At this moment a very violent fit, of an epileptic appearance, with violent spasms of the head, of the kind mentioned above (although greatly aggravated) took place. These spasms had appeared about every ten minutes. We hastily descended to the cabin, and as soon as the power of swallowing returned administered a wine-glass full of very strong tincture of the guaco. We waited in extreme anxiety to see the result of this our firs essay in grappling with a formidable enemy hitherto accounted invincible, with a power, new to us, indeed, but the fame of which was widely spread. It may well be imagined how great was the intensity of our impatience in awaiting the lapse of the usual period intervening betwixt the convulsive attacks. Ten, twenty, thirty, and forty minutes over without any return of the convulsions. The pulse was strong, full, and accelerated—there was much pain in the head, with somewhat of drowsiness, and a profuse flow of perspiration. We left the patient, ordering the same dose to be given in about an hour and a half after the first dose, should no convulsion appear, but immediately on a threatening of such. About a quarter of an hour after we left a slight convulsive attack came on, when the dose was repeated. As we had left orders to be sent for should matters again become unfavourable, we were agreeably surprised to pass the night without being called, the last attack being so slight as not to appear to his father sufficiently serious to cause him to disturb us, more especially as he was satisfied he had a sufficient remedy with him. The young man in a day or two was quite well. I may here observe that the snake was neither seen before nor found on board afterwards, it having in all probability slipped over the side of the vessel after inflicting the wound. No one, however, ever expressed a doubt as to the identity of the bite with the snake which had so cleverly evaded the boat's crew.

"The other three cases occurred to two Indians and a Carib, and were treated in the same manner. In all, after giving guaco, the pulse became exceedingly strong and full, with intense headache and flushed countenance, followed after a time with a profuse flow of perspiration. These symptoms would doubtless have led me to the free use of the lancet, had I not previously reflected well on the treatment I should adopt. A strong tincture was used and given by the wine-glass full. It might be said that the quantity of spirits would of itself account for all the symptoms which manifested themselves after the exhibition of the guaco, but when it is mentioned that the whole of the last-mentioned sufferers were in the almost daily use of drinking large quantities of spirituous liquors, this surmise becomes dissipated. I have not a doubt upon my own mind that the symptoms were produced by the guaco, and as the necessary results of its internal exhibition, in whatever form given, provided the dose be large, and given with a bold hand, and that previous depletion, either by the lancet or otherwise, had not preceded its use. I, moreover, am of opinion that the entire success of the treatment arose from the action of the guaco on the body not having been interfered with, or in any way modified, by a random recourse to the lancet, without reflection that its use might altogether destroy the efficacy of the peculiar power admitted to reside in this singular plant. * * * The guaco is frequently used in intermittent fever instead of bark or quinine, and as a good stomachic in dyspeptic or debilitated state of the intestinal canal."

I shall procure some guaco at the earliest opportunity, and forward it to your Society. I think it is very desirable that the properties of this plant should be tested in England. I should recommend that some animal—say a dog or a rabbit—should be bitten by the most venomous snake in the Zoological Gardens, and that a strong dose of the tincture of guaco should be administered immediately afterwards. Dr. John Gowry says, "When speaking of the valuable properties of the guaco plant, Dr. F. Young has sometimes expressed himself as of opinion that it would be found a safe and sure cure for hydrophobia, the bite of the snake and mad-dog being equally animal poisons."

It is time, however, that I should conclude this letter, which has grown to such an unreasonable length. Should my communication, however, be fortunate enough to meet with your approval, I shall trouble you again, for I have yet much to say concerning the productions of this country.

I remain, sir,
Your's very faithfully,
R. TEMPLE.

THE DISCUSSION ON THE SMOKE NUISANCE.

1, Fish-street-hill, City,
London, Jan. 22, 1855.

SIR,—I beg the favour of your correcting an error in your report of what I said on Wednesday last, in the discussion on Mr. G. W. Muir's paper on "The Smoke Nuisance," an error that I may say partook of the faltering manner of my delivery, caused by previous exhaustion.

In agreeing with Mr. Muir that sufficient dimensions, draught, &c., were necessary to economical combustion, I did not admit that these alone would effect that object, or cause the prevention of smoke; but, on the contrary, I affirmed that such preliminary conditions still required some appropriate invention as an indispensable adjunct. For if it were not so, how is it, where ample dimensions, draught, &c., already exist, that, without smoke-preventing appliances, the chimney-shafts of such premises evolve just as much smoke as others?

Allow me to add a few words relative to the paper itself.

With an evident bias against inventions for the prevention of smoke, and very particularly so against those of comparatively recent date, Mr. Muir gave the Society much valuable information; but, whilst he referred to precedents commencing with the present century, he completely ignored all that has been done in the metropolis during the last eighteen months—since, in fact, he saw the first few furnaces out of the hundreds I have myself in operation; and what is of more consequence, as far as his own testimony is concerned, Mr. Muir omitted all mention of his personal experience as Inspector of Smoke Nuisance in Glasgow, which, for practical purposes, would have been of paramount importance in the opinion of his audience.

I should further state that I dissent from several leading propositions set forth by Mr. Muir; but which, having been so admirably expressed by Mr. William Fairbairn, F.R.S., who presided with so much efficiency on the occasion, among the points upon which he differed with the author of the paper, it would be presumptuous in me to repeat.

I am, sir,
Your most obedient servant,
J. LEE STEVENS.

SIR,—In Mr. G. W. Muir's interesting paper "On the Consumption of Smoke," he referred to the silk mills of Messrs. Walker, in Salford, as a proof that, by a proper construction of the furnace and boiler, the opaque smoke may be almost entirely consumed without any special apparatus. I have great pleasure in confirming this statement, having visited the above mill some months since, after the old boiler had been replaced, and the engine altered. The following comparison strikingly illustrates the difference in the consumption of fuel between the old and the new modes of construction:—

	FORMERLY:—	
Engine.	*Boiler.*	*Pressure.*
Hand gear, in good order.	Good Waggon.	8lbs.
	ALTERED TO:—	
Variable expansion, by Petrie, of Rochdale.	Galloway's Patent, Well clothed.	12lbs.

The saving effected by the change in the engine was 40 per cent., and by the boiler 26 per cent., equal to 66 per cent.

The plan is, as Mr. Muir states, "to draw the red coal to the front, and throw the fresh to the back. When this is done the flame from the front plays over the fresh fuel, and ignites the upper portion, thus burning it downwards. The fire is also carried forward by the draught, and the whole mass is soon ignited. *An immense quantity is thrown on at once, the furnace being supplied but thrice per day.*" Thus a large amount of labour is saved. I saw the furnace supplied, and went outside the mill to see the amount of smoke made. It did not equal that proceeding from an ordinary cottage fire, and speedily ceased altogether.

While on the subject of smoke-consuming, could you inform the public where they may obtain the domestic smoke-burning grates invented by Dr. Arnott, and explained by him at one of your meetings last year?

I remain, sir,
Yours respectfully,
JAMES HOLE.

Leeds, Jan. 22, 1855.

STATISTICS OF THE IRON MANUFACTURE.

Sir,—The important position held by the manufacturers of iron, and the increasing importance of that manufacture, it being, as I stated on a former occasion, *progressive*, so that every new application has the effect of still further proving its value and universal usefulness, has lately induced me to propose a project, which I have for sometime contemplated, of offering to undertake the duties of a kind of general secretary to the iron trade, in the collection of statistical matter relating to the production and application of iron in all its branches, in this and other countries, feeling satisfied that the more its advantages are known, the more will be the general requirement for its possession. With this view I wrote to the chairman of the Ironmasters' Meetings, in Staffordshire, and since then I addressed a letter to the Editor of the *Mining Journal*, which was published in that paper of Saturday last, and was deemed worthy of a favourable notice by the editor in one of his leading articles. The same object now induces me to address you, in the hope that my letter may be allowed a place in the columns of your Journal, as a subject intimately connected with the Arts, Manufactures, and Commerce of the country.

When I read my paper on "The Growth and Expansion of our Foreign and Colonial Trade in Iron, and the Fiscal Obstructions to its Extension," I was particularly struck with an observation made by the chairman (James Wilson, Esq., M.P.), in commenting upon the discussion which took place after the reading of the paper. It was as follows:—

"There was one remark which had forcibly struck him, as tending to clear away the mist and exaggeration with which the iron trade was surrounded. When they saw particular cycles in trade in which an article was rising ten or twenty per cent. annually in the amount consumed, succeeded by a mania like that of railways, they became naturally afraid of a revulsion. There could be no doubt that in its progress from protection to freedom the iron trade had been subject to revulsions, and they found that distress had occasionally existed in the iron districts, and it was because of their large population that they laboured under some apprehensions on the subject. There had been a remark made, however, which he thought ought, in a great measure, to relieve them from apprehension; for, though, the iron districts, like all others, must still be subject to fluctuation, yet that remark showed that the trade was in the main founded on a solid basis. Mr. Simmonds had remarked that all the railways in the kingdom only contained 1,500,000 tons of iron, but Mr. Bird had improved upon the remark, by showing that they contained 2,500,000 tons; when, therefore, they came to see that the make of iron for the year was upwards of 3,000,000 tons, that would show that the railways could not have exercised any very material influence on the trade, as the whole of the rails yet used was not equal to one year's produce of iron. That was a fact calculated to show them that it was not upon railways, or on any peculiar department of the trade they must chiefly rely, but upon the cheapness and perfection of their make, rather than occasional speculation, though that might produce a temporary effect upon prices." These observations appeared to me, when I heard them, of great and striking importance; they do so still more at the present time, when one of the revulsions in the trade is actually taking place. It must, when considered, lead to the conclusion that the present state of depression can be but temporary, because the great consuming channels of the country are still in full activity—namely, the agricultural, manufacturing, and shipping interests. And in America, although circumstances have occasioned a check, the use of iron is so well understood and appreciated—and in foreign countries where it is, I may say, becoming known—the demand cannot stop for any lengthened period, and the more the advantages we possess become gradually known, so much the sooner will the supply of this most essential metal be required for general use, and Government will be called upon for the abandonment of the remains of restrictive tariffs.

It is with an intention of making known the uses of iron in this country, and the means we have of supplying any required quantity, provided supplies of ironstone, conveniently situated, are forthcoming, that I offer my services,—having been accustomed for many years to make it a study to collect and arrange materials connected with the iron manufactures—provided I have reasonable support. How far the Society, as a body, will be willing to assist such an inquiry, I, of course, can have no means of knowing, but possibly many of the members may not object to come forward if an arranged plan for the attainment of the object I have in view can be organised.

I remain,
Your faithful servant,
HARRY SCRIVENOR.

Liverpool, January 23, 1855.

BENZINE—BENZOLE.

Sir,—I notice in your Journal, No. 110, page 104, a letter by Mr. Mansfield, quoting and remarking on a passage from a paper by Mr. F. Crace Calvert, in a former number. I observe also, at page 131, a note from Mr. Calvert in answer to this letter.

I am exceedingly unwilling, and it is quite contrary to my habit, to take part in controversy. I am not now about to break my rule, but I feel bound to ask you to insert the following remarks in your next number. I think it my duty to do so, not only on general grounds of justice, but because the experiments of Mr. Mansfield, to which he refers in the letter which I first mentioned, were made by that gentleman in my laboratory, at the Royal College of Chemistry, and because I watched the tedious process which Mr. Mansfield patiently carried on for many months, and by which he obtained, amongst other interesting results, the facts which he truly states to have been his discovery.

I am disposed to regret the tone of warmth which appears in Mr. Mansfield's letter. I must, however, point out, that the few words in which Mr. Calvert replies to Mr. Mansfield's strictures in no way meet the objection which Mr. Mansfield raises to Mr. Calvert's statement concerning "Benzine." The chief points to which Mr. Mansfield calls attention in his letter, are circumstances of scientific history and of literary fact. He appeals on this matter to the only tribunal which can consider it,—that of science.

Such questions as the following are not subjects for Courts of Law: Are "Benzine" and "Benzole" accepted synonyms? Who gave the name "Benzine" to a product contained in coal-naphtha? Is "Benzine" coal-naphtha purified, or is it a peculiar substance? Who first found "Benzine" in useful quantity in coal naphtha? Who first pointed out its utility as a solvent of grease and as a detergent? Who first introduced it into England?

These are the main points raised in Mr. Mansfield's letter against Mr. Calvert's statement. The answers to these questions are matters of history, and not of law; and I am bound to declare, that the assertions made by

Mr. Mansfield regarding these points are in every respect exactly correct.

It is true that Mr. Mansfield, in his letter, raises by implication a secondary question, as to the validity of Mr. Calvert's recent patent. On this question, of course, I have nothing to say; this is simply a matter for legal decision; but, in the present case, it is only a subordinate question, and to merge the first dispute in the second, which is altogether beside it, appears to me an evasion of the point at issue.

I am, sir, yours, &c.,
A. W. HOFMANN.

Royal College of Chemistry, Jan. 24, 1855.

FIRE DAMP.

Sir,—A proposal to illuminate coal mines with gas, may at first sight appear visionary and chimerical, but it is hoped that when the experiment is tried and tested, in the mode devised, the project will prove both sound in principle and successful in practice. The manufacture of gas in a convenient chamber of the mine, can be easily accomplished at a trifling cost, and it only requires sufficient ventilation, to which the additional heat will contribute, effectually, to complete the process. The laying and fixing pipes in proper positions and suitable distances, presents little difficulty. The burners must be carefully protected from danger by means of gauze-wire safety covers, the lamps being lit by a galvanic battery and conducting wires. As it is well-known that fire damp explodes on ignition by an electric spark, the presence of the insidious element can be at any time detected by the aid of this simple agency, and precautions adopted to neutralise its baneful power. A large portion of its ingredients will be gradually consumed by the combustion created, and the formidable enemy not only subdued, but rendered instrumental to its own destruction.

Should the anticipated results be realised, an apparatus, combining various scientific discoveries, will be contrived, that affords increased security to the workmen engaged in this perilous occupation, while facilitating the operations of labour, with diminished risk to human life.

M. T. K.

THE F.S.A. QUESTION.*

Sir,—Observing a correspondence in the *Journal of the Society of Arts* relative to the wrong application of the initials F.S.A. to members of the Society of Arts, such initials being the distinction of the Antiquarian Society, as one who has been inadvertently guilty of permitting this irregularity, I beg to offer a remark on the subject.

The initials F.S.A. having been applied to my name by friends and others who were aware of my being a member of the Society of Arts, I was induced to make inquiries into the propriety of such addendum, when I was referred to "Maunder's Treasury of Knowledge," wherein, at page 354, under the head of "A List of Abbreviations with their Explanations," will be found :—

"F.A.S.—*Fraternitatis Antiquariorum Socius.*

"F.S.A.—*Fraternitatis Artium Socius.*"

With such an authority there seemed no question as to the legality of the affix, and as I did not see any reason why I should be ashamed of being associated with such a very important and useful institution as the Society of Arts, I not only did not check the application of such initials to my name in public notices referring to me, but also permitted them to be applied in sundry books and pamphlets published by me.

As this erroneous information in "Maunder's" may possibly have caused others to err as well as myself, this reference to it is interesting to the question.

I have the honour to be, Sir,
Yours obediently,
H.C.

Gosport, 13th Jan., 1854.

THE COST OF PEAT CHARCOAL.

204*a* Upper Thames-street, Jan. 25th, 1855.

Sir,—I had much pleasure in listening last evening to Mr. Longmaid's paper on "Peat and other Vegetable Charcoal," but having been obliged to leave early, I was unable to put that gentleman right as to the cost of preparing "Peat Charcoal," which, I understood him to say, was about 12s. per ton.*

This, certainly, is an error, as "The Irish Amelioration Society" calculated their cost at 20s. per ton, after allowing for a *supposed profit* on paraffine, sulphate of ammonia, &c., extracted from the bog. I say supposed, because we know the Society has not prospered. I therefore now give you the cost of preparing and bringing to market the charcoal from English bog, for which I am agent, and which, with one exception, is the only source of supply in England.

With respect to treating dry bog pulverised, with sulphuric acid, I think commercially it would be a failure.

Yours faithfully,
MARK FOTHERGILL.

Cost of making peat charcoal, and delivering for sale in London, per ton :—

	£	s.	d.
Draining, and value of bog . .	0	6	9
Contract for cutting, piling, drying, and burning	1	10	0
Grinding	0	2	9
Carriage from bog to wharf in London	0	9	5
Warehousing expenses . .	0	4	6
	£2	13	5
Leaving for rent, profit, agency, outlay for kiln, drying sheds, utensils, &c.	0	6	7
	£3	0	0

REMARKS ON REPORT ON TRADES WHICH AFFECT THE EYES.

Sir,—In the admirable Report of the Committee on Industrial Pathology on Trades which Affect the Eyes, no suggestion is made in the case of persons exposed to excess of light, as glass-blowers, smelters, &c., where coloured media are inadmissable. Would it not be well to try the Lapland snow-blinkers, which are very effectual in preventing snow-blindness, a species of amaurosis very common in the Arctic regions.

The snow-blinkers consist of two hollow shells, of any light material, large enough to cover the eyes, with a long and very narrow horizontal slit for vision.

Perhaps a vertical slit might suit some trades, or even one in the form of a very slender cross, such as we often see in the vizors of ancient helmets.

The blinker spectacles ought to be made exceedingly light, and easy to put on and off, and should be so fitted as to enable the wearer to throw them back with a jerk of the hand when not looking into the melted metal. A pure Cochin China egg would be exactly the thing, cut in two lengthways; some of them will bear very heavy blows without injury.

Your's very truly,
HENRY W. REVELEY.

Parkstone, Poole, Dorset, January 15th, 1855.

---

* The Secretary begs to inform the members of the Society, that neither by the Charter, by the Bye-Laws, nor by custom for upwards of one hundred years, is there any authority for members to place after their names any letters denoting membership.

* Mr. Longmaid's statement was, that this would be the cost by *his new* process.—Ed.

Proceedings of Institutions.

◆

Bury (Lancashire).—The annual meeting of the Athenæum was held on the evening of the 16th instant, in the Lecture-hall of the Institution. The chair was taken at seven o'clock, by the president, John R. Kay, Esq., after which the meeting proceeded to the election of the various officers for the ensuing year. At eight o'clock the secretary read the report of the past year, from which it appears that the Institution is in a very satisfactory state, the average number of members for the past year having been 757, and the number in the last quarter being 850, which is an average increase of 184 members over last year. The receipts for the year have been £656 6s. 5d., and the disbursements £651 15s. 5d., leaving a balance in the treasurer's hands of £4 11s. There have been added to the library 279 volumes in the past year, including a present from the Lord Bishop of Manchester of 132 volumes of the Cabinet Cyclopædia. The classes are well supported, the news-room in a prosperous state, and the lectures and other departments of the Institution well appreciated by the members.

Derby.—The fourth annual report of the Railway Literary Institution, whilst regretting that so many of the Company's servants still stood aloof from the Institution, expresses the confident hope that as its means of usefulness are increased, its advantages will be better appreciated. There has been an increase during the year of 57 members, the total number being now 252. The number of volumes in the library amounts to 1,300, and the weekly issues to 114. Various donations have been received, including £2 each from the borough members, and £25 from Sir J. Paxton, M.P. The receipts from all sources were £117 10s. 2d., the disbursements £93 4s., leaving a balance in the treasurer's hand of £24 6s. 2d.

Dunmow.—On Wednesday, the 3rd instant, the General Annual Meeting of Members of this Institution was held in the enlarged Town-hall, when the committee gave in their report and produced their accounts. It was shown that the funds were in a very prosperous condition, there being a more than usually large balance in hand, to be appropriated to the purchase of books, &c.; and also that the general prospects of the Institution were brighter than they had ever been since its commencement. On the following evening, the Rev. C. Lesingham Smith, the President, delivered a lecture on "The Holy Sepulchre at Jerusalem, and the various buildings which have been erected over and around it." A number of large sketches and diagrams, executed by himself, were referred to in illustration of the lecture, which was well received by a numerous audience.—The Rev. H. Gammidge gave a lecture on Wednesday, the 17th instant, to a numerous audience, on "Steam Power and its Applications." He commenced by remarking that the extensive influence now exerted by steam power, and the many ingenious contrivances connected with it, render it a subject worthy of attention and inquiry. After a brief statement of the fundamental principles upon which the power rests, he proceeded to give some account of the observations made upon the phenomena in early times. Various names, from Hero of Alexandria to the middle of the last century, were mentioned, special prominence being given to the labours of Edward Somerset, Dr. Papin, Newcomen, and James Watt. The lecturer then went on to point out some of the numerous and important applications of steam power made in modern times, and the bearings it has thus had on the welfare of the human race. Its employment in the several departments of manufacture, in printing, in locomotion by land and sea, and in agriculture, all passed under notice, its adoption by the latter quiet and ancient science being regarded as an unmistakeable proof of the complete ascendancy of steam power. The lecturer concluded by arguing from the past, yet greater things in the future, and by expressing the conviction that this marvellous agency, much as it has already done, is destined to do still more, in securing the highest and happiest results for the nations of mankind.

Highworth.—The Second Annual General Meeting of the Members of the Literary and Scientific Institution was held on Monday, the 1st instant. The meeting was well attended. The Rev. Edward Rowden, Vicar, and President of the Institution, took the chair, and called on Mr. J. C. Salmon, Honorary Secretary, to read the Report of the Committee, which stated that the number of members for the past year, some subscribing one pound, and others ten shillings each, was fifty eight, showing a diminution of six members of these classes as compared with the preceding year. The subscribers of one shilling per quarter were eight. Upwards of seventy visitors have been introduced to the Reading Rooms during the year by members of the Institution. Agreeably to a resolution at the last annual meeting, the Institution has been put in Union with the Society of Arts, by which it had already experienced a considerable pecuniary saving by purchasing books from publishers in connection with the Society. Sixty-four volumes have been purchased during the year, making the total number in the library 296. The report concluded by urging the members to deliver lectures or prepare papers on subjects of general interest, and on which they might feel qualified to dilate, as the funds of the Institution were not more than sufficient to meet the ordinary requirements. After the reading of the Report, several of the members present offered to give lectures gratuitously. A vote of thanks was unanimously accorded to the Secretary, for having originated the Institution, and for the gratuitous services he had rendered since its establishment.

Pimlico.—On Monday, the 22nd instant, Mr. Adolphus Francis gave a dramatic reading of Bulwer Lytton's play "The Lady of Lyons," at the Literary, Scientific and Mechanics' Institution. Owing to the inclemency of the weather the attendance was small, but, judging from the attention and applause which was accorded to Mr. Francis, it was evident that his manner of treating the play was much admired. During the earlier portion of the month two lectures on "Voltaic Electricity," illustrated by experiments, were delivered by Mr. John S. Blockey, of the Royal Polytechnic Institution, and one on "Edgar Allan Poe—his Life and his Muse," by Mr. Frank E. Fowler, which he illustrated by reciting several of the poetical works of Poe, more especially "The Raven" and "The Bells."

MEETINGS FOR THE ENSUING WEEK.

Mon. Actuaries, 7. Mr. S. Brown, "On the Rate of Sickness and Mortality amongst the Members of Friendly Societies in France."
Tues. Royal Inst., 3. Professor Tyndall, "On Magnetism."
Civil Engineers, 8. Mr. J. Phillips, "Description of the Large Iron Roof, in one Span, over the Joint Railway Station, New-street, Birmingham."
Wed. Society of Arts, 8. Mr. S. C. Homersham, "On the Chalk Strata considered as a Source for the Supply of Water to the Metropolis."
Geological, 8. 1. Mr. Odernheimer, "On the Geology of the Peel River District, Australia." 2. Mr. Rosales, "On the Geology of the Ballarat Gold-Fields, Australia." 3. Mr. D. Forbes, "On the Geology of part of Norway."
Thurs. Zoological 3.
Royal Inst., 3. Mr. Donne, "On English Literature."
Antiquaries, 8.
Photographic, 8. Anniversary.
Royal, 8½.
Fri. Society of Arts, 8. Special Meeting. Mr. Leone Levi, "Observations on the Proposed Congress for the Improvement of International Commercial Law."
Botanical, 8.
Royal Inst., 8½. The Astronomer Royal, "On the Pendulum Experiments lately made in the Harton Colliery for ascertaining the Mean Density of the Earth."
Sat. Asiatic, 2.
Royal Inst, 3. Dr. J. H. Gladstone, "On the Principles of Chemistry."
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS,

Delivered on 23*rd January*, 1855, *and during the Christmas Recess.*

Par. No.
9. Ecclesiastical Commission (Ireland)—Report.
13. Turnpike Trusts—Return.
6. Clergy (City of London)—Return.
8. Destitute Children (Dublin)—Return.
12. Waterford, &c., Mails—Return.
10. Metropolis Buildings Act—Correspondence.
17. Corporal Punishments (Navy)—Return.
16. Epidemic (Bermuda)—Copy of Despatch.
11. Naval Stores, &c.—Statement.
Bill—Savings' Banks and Friendly Societies Investments.
Agricultural Statistics (Ireland)—Return.
Coal Mines—Reports of Inspectors.
Royal Forests—Instructions to the Surveyors.
Railway Accidents (August, September, and October)—Reports.
Quarantine (Plague of Malta in 1813)—Appendix V. to Second Report of Dr. Burrell.
Convict Prisons—Report by Lieutenant-Colonel Jebb.
Jamaica—Papers.
Australia (Discovery of Gold)—Further Papers.
Australian Colonies (Crown Lands)—Further Papers.

Session 1854.

448. Indices to Reports of Commissioners (Docks and Harbours)—1802-1853.
507. Railways—Abstract of Return.
461. Taxes Repealed, &c., (Revenue and Expenditure, Loans and Grants)—Return.
57 (11). Trade and Navigation—Accounts.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Jan.* 19*th*, 1855.]

Dated 1*st December*, 1854.

2525. J. Whitworth, Manchester—Cannons, guns, and fire-arms.

Dated 28*th December*, 1854.

2735. M. Williams, Chelsea—Suspending looking-glasses.
2737. P. Haworth, Manchester—Band fastener.
2738. R. Threlfall and R. W. Pitfield, Bolton-le-Moors—Spinning machinery.
2739. J. Murdoch, 7, Staple-inn—Waterproofing woven fabrics. (A communication.)
2741. J. Gray, Liverpool—Adjusting ships' compasses.
2742. G. J. Bensen, 7, Christian-street—Refining sugar.
2743. H. C. Hill, Parker-street, Kingsland—Portable barracks.

Dated 29*th December*, 1854.

2744. J. Nasmyth, Barton-upon-Irwell—Forging masses of iron.
2745. F. Thompson and W. Wagstaff, 12, Pall-mall East—Photography.
2746. A. Dietz and J. G. Dunham, Raritan, New Jersey, U.S.—Reaping machines.
2747. A. Stansfield and J. Greenwood, Todmorden—Power-looms.
2748. I. Z. Bell, Sandfield-place, Lewisham-road—Boots and shoes.
2749. H. Widnell, Lasswade—Carpets.
2750. E. Loysell, Paris—Injecting machine.
2751. T. Thorneycroft, Wolverhampton—Ship-building.
2752. J. Pillans, 40, Brompton-crescent—Preparation of hematosin and fibrinous and serous matters.
2752. H. R. and I. A. Fanshawe, North Woolwich—Waterproof garments.

Dated 30*th December*, 1854.

2755. R. Chapman, Manchester, and J. Miller, Stalybridge—Spinning machinery.
2757. G. Mallinson, Manchester, and H. Ridings, Newton-heath—Woven fabric.
2759. G. E. Dering, Lockleys—Motive power by electricity.
2761. T. Slater, Somers-place West, and J. Tall, Crawford-street, Marylebone—Planes.
2763. B. Hughes, Belfast—Bakers' ovens.

Dated 3*rd January*, 1855.

12. J. K. Harvey and D. Pearce, London—Calendar inkstand.
14. H. Fontaine, Marseilles—Engravers' presses.
16. W. Kendall and G. Gent, Salford—Machinery for cutting metals.
18. J. H. Johnson, 47, Lincoln's-inn-fields—Coating iron with copper. (A communication.)
20. C. Hustwick and W. Bean, Kingston-upon-Hull—Railway buffers and springs.
22. J. Venables and A. Mann, Burslem—Raised ornaments on metal, pottery, &c.
24. T. W. Rammell, Trafalgar-square—Furnaces.

Dated 4*th January*, 1855.

26. C. Watt, Victoria-wharf, Regent's-park-basin—Preparing coffee.

Dated 5*th January*, 1855.

28. G. Bowden, 1, Little Queen-street, Holborn—United adhesive book-headband and register ribbons.
30. L. D. Girard, Paris—Motive power.
32. J. Livesey, 20, Kennington-gore—Printing. (A communication.)

Dated 6*th January*, 1855.

34. B. Cook, Birmingham—Separating metallic filings.
36. T. Delabarre and A. Bonnet—Preservation of food.
38. D. Joy, Worcester—Pistons.
40. G. H. and H. R. Cottam, Old St. Pancras-road—Iron bedsteads.

Dated 8*th January*, 1855.

42. W. G. Craig, Gorton, near Manchester—Railway buffer cases and rams.
44. J. Player, 2, Winchester-buildings—Prevention of smoke.
46. P. A. le Comte de Fontaine Moreau, 4, South-street, Finsbury—Alcohol. (A communication.)
48. A. Nagles, Ghent—Cleaning surfaces of woven fabrics.

Dated 9*th January*, 1855.

50. S. S. Shipley, Stoke Newington—Washing machinery.
52. T. Hodgson, Morley's Hotel—Paddle-box life-boat.
54. A. G. Guesdron, Paris—Table.
56. N. J. Amies, Manchester—Winding yarn.
58. E. Bow, Glasgow—'Blackening' for foundry purposes.
60. I. Lamb and F. B. Fawcett, Kidderminster—Fabrics.

INVENTION WITH COMPLETE SPECIFICATION FILED.

79. A. E. L. Bellford, 32, Essex-street, Strand—Tanning. (A communication.)—12th January, 1855.

WEEKLY LIST OF PATENTS SEALED.

Sealed January 19*th*, 1855.

1599. Sir John Scott Lillie, Pall-mall—Improvements in fire-arms.
1621. Richard Roberts, Manchester—Improvements in machinery for punching, drilling, and rivetting.
1623. Auguste Castets, Paris—The extraction of a substance for supplying the place of quinine.
1629. William Grundy, Bury—Improvements in the manufacture of drugget.
1647. William Littell Tizard, Aldgate—Improvements in fermentation and in apparatus employed therein.
1695. Richard Archibald Brooman, 166, Fleet-street—Improvements in machinery for dressing flax, hemp, and other like fibrous substances.
1697. John Simon Holland, Woolwich—Improvements in locks.
1755. Peniston Grosvenor Greville, Lombard-street—Improvements in the manufacture of cards for working wool and cotton.
1849. William Shepherd Smith, Charlotte-street, Fitzroy-square—Improvements in pianofortes.
1975. Peter Rothwell Jackson, Salford—Improvements in the manufacture of wheels.
2051. Pietro Feloj, 183, Fleet-street—Improvements in the manufacture or construction of a knife and fork.
2645. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the manufacture of piled goods, and in the machinery or apparatus employed therein.
2475. George Collier, Halifax—Improvements in the manufacture of pile fabrics and other weavings.

Sealed January 23*rd*, 1855.

1630. Ephraim Hallum, Stockport—Improvements in machines for preparing, spinning, and doubling cotton and other fibrous substances.
1641. John Chilcott Purnelle, Tachbrook-street, Pimlico—Improvements in obtaining and applying motive power.
1643. Louis Christian Koeffler, Rochdale—Improvements in finishing or polishing yarns or threads.
1644. Robert Henry Thompson, Old Charlton—Universal self-acting sawing machine.
1676. John Yuil Borland, Manchester—Improvements in machinery for preparing and spinning fibrous materials
1684. Henry Adams, 3, Leonidas-terrace, New-cross—Revolving ventilator.
1696. Thomas Edward Merritt, Maidstone—Improvements in apparatus for taking photographic pictures in the open air.
1714. Charles Weightman Harrison, Richmond—Improvements in obtaining and applying electric currents, and in the treatment of certain products derived in obtaining the same, part or parts of which improvements is or are applicable to the production of motive power.
1715. Auguste Boissonneau, Paris—Improvements in artificial eyes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Name.	Address
Jan. 19.	3677	Shirt Collar	John Edward Smith	26, Wood-street, Cheapside.
,, 20.	3678	Educational Seat and Desk	Richard Webb George	28, Edward-street, Portman-square